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THE LONG RANGE EFFECTS OF A LANGUAGE STIMULATION PROGRAM UPON NEGRO EDUCATIONALLY DISADVANTAGED FIRST GRADE CHILDREN. FINAL REPORT.

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THE SHORT- AND LONG-RANGE EFFECTS OF A LANGUAGE STIMULATION PROGRAM ON THE LINGUISTIC ABILITY AND INTELLIGENCE OF EDUCATIONALLY DISADVANTAGED FIRST-GRADE NEGRO CHILDREN WERE STUDIED. SUBJECTS WERE RANDOMLY PLACED IN EXPERIMENTS (E) AND CONTROL (C) GROUPS OF 32 PUPILS MATCHED ON STANDARDIZED PRETEST BATTERIES WHICH DETERMINED THEIR LANGUAGE AND MENTAL AGES. THEY ALSO WERE MATCHED BY SEX AND SOCIAL CLASS. THE E-GROUP RECEIVED THE FIRST 40 LESSONS IN THE EXPERIMENTAL EDITION OF THE PEABODY LANGUAGE DEVELOPMENT KIT WHEREAS THE C-GROUP HAD NO SPECIAL TREATMENT BUT ONLY PARTICIPATED IN THE TESTING PROGRAM. IMMEDIATE POSTTESTING WITH THE PRETEST EVALUATION BATTERY SHOWED "VERY" SIGNIFICANT GAINS BY THE E-GROUP IN IQ, MENTAL AGE, AND LANGUAGE AGE, BUT NO DIFFERENCE IN READING ABILITY, EXCEPT THAT GIRLS CONSISTENTLY SCORED HIGHER THAN BOYS. WHEN THE SUBJECTS WERE RE-EVALUATED 20 MONTHS AFTER THE END OF TREATMENT, THE E-GROUP HAD MAINTAINED ITS GAINS IN LANGUAGE, MENTAL AGE, AND IQ, ALTHOUGH THE ABSOLUTE DIFFERENCE BETWEEN GROUPS DIMINISHED SOMEWHAT ON LANGUAGE AGE SCORES. ON THIS LATER EVALUATION THE E-GROUP ALSO SCORED SIGNIFICANTLY HIGHER ON TWO STANDARD READING TESTS. THE FINDINGS IMPLY THAT THE CUMULATIVE DEFECT IS FOUND AMOUNG DEPRIVED CHILDREN IS NOT IMMUTABLE AND THAT EARLY STIMULATION PROGRAMS CAN REVERSE THE DOWNWARD TRENDS IN THEIR LANGUAGE AND MENTAL ABILITIES. STUDIES OF THE MOST POTENTIALLY SUCCESSFUL FRACTICES FOR SUCH A PROGRAM AND OF ITS APPLICABILITY TO OTHER GROUPS ARE NEEDED. (NH)

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May 1967

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

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JOHN L. CARTER, PH.D.

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Although hours of work by a great many persons were required to bring this investigation to fruition, the principal investigator accepts sole responsibility for the conduct of the investigation and the contents of this report.

THE LONG RANGE EFFECTS OF A LANGUAGE STIMULATION PROGRAM UPON FIRST GRADE EDUCATIONALLY DISADVANTAGED CHILDREN

INTRODUCTION

The current study was designed to explore both the short and long range effects of a language stimulation program upon educationally disadvantaged children. Effects upon indices of intelligence as well as linguistic abilities, were focused upon.

Related Literature

Recently there has been a growing interest in and educational focus upon children from culturally disadvantaged home backgrounds. Generally, most research agreed that these children are at a severe disadvantage when starting school and competing with children from more verbally stimulating homes (Silberman, 14). Reissman (13) also noted that the vocabulary and language of deprived children are not those he uses in school. Many studies indicated that, in part as a result of language deficiency, disadvantaged children achieve poorly in school and that intelligence scores as assessed by the Stanford-Binet become progressively lower as these children grow older (Kennedy, et. al., 10).

A number of studies have pointed to the possibility of increasing intellectual ability through language stimulation (Kephart, 11; Kirk, 12; Skeels, 15; Smith, 16). Although a number of studies concerning the enhancement of intelligence of mentally retarded children were reported, few have focused upon the culturally disadvantaged child until recently. Also, most studies located reported upon language enhancement only. No published experimental study was located which purported to augment both linguistic and intellectual abilities of disadvantaged children through a language stimulation program. Nevertheless, there was research evidence which indicated that there is a good possibility that many children of lower socio-economic status owe their retardation, in part at least, to their deprived environment (Wakefield, 17). Silberman (14) stated that somehow "an impoverishment of environment--must be compensated for in some way if it is to be overcome," (p. 6).

An apparent need at this time was a systematic investigation upon the effects of a language stimulation program early in an educationally deprived child's school experience. Similar research has been conducted with the educable mentally retarded, the trainable retarded, and the cerebral palsied (Smith, 16; Blue, 3; Hart, 8).

Hypotheses

Basically, the objective of this proposal was to determine to what extent a systematic language development program will augment mental age and language age scores of Negro educationally disadvantaged first grade children. The specific hypotheses were:

1. A language development program will enhance the language age scores of the experimental group over the control group.

2. A language development program will enhance the mental age of the experimental group over the control group.

3. A language development program will enhance the reading ability of the experimental group over the control group.

PROCEDURE

Selection and Matching of Subjects

The subjects consisted of 32 matched pairs of Negro first grade children. Matching was done on the basis of language age, mental age, chronological age, sex, and social class affiliation of the parents. One of each pair was randomly assigned to one of two groups. When the two groups both contained 32 subjects, one was randomly assigned as experimental. The other became the control group. Each group had an equal number of boys and girls. The first criterion of selection was that all subjects must be from the low social class home backgrounds. The McGuire-White Index of Social Status was obtained on the status parent of all children. This necessary information was obtained from recent school records and from the teacher and principal. The Index of Social Status is obtained by summing weighted scores for occupational level, educational attainment, and source of income concerning the status determining parent. The scale is constructed so that the high numerical value denotes lower social status. The possible total scores ranged from 12 to 84. In this study, the numerical range for social class was from 65 to 78. All subjects were drawn from low social class homes.

Table 1 shows the statistical data for social class as well as for the other three matching variables for the experimental and control groups. The first column presents data on the Index of Social Status. The mean scores of 70.41 and 70.34 for the experimental and control groups were analyzed for significance by use of the "t" test for matched pairs as outlined by Edwards (6, pp. 278-281). A "t" value of .0383 indicated that two means do not differ significantly from chance variations. The F value of 1.3722 showed that the variance of the two groups were the same within sampling error.

TABLE I

STATISTICAL DESCRIPTION OF MATCHED GROUPS

Matching Variables

Pair No.	Social Class		Chronological age in months		Mental age in months		IQ		Language age in months	
	Exper.	Cont.	Exper.	Cont.	Exper.	Cont.	Exper.	Cont.	Exper.	Cont.
*01	68	70	80	80	74	79	91	86	59	54
*02	75	71	77	82	60	62	76	73	60	64
*03	68	70	80	77	70	67	86	86	69	66
04	66	68	82	84	67	67	80	78	61	58
05	65	76	97	98	65	63	65	62	53	60
*06	71	71	77	80	58	62	73	75	54	59
07	75	68	80	77	55	53	66	66	49	55
*08	76	71	76	75	62	60	80	78	54	61
*09	67	65	81	80	66	65	80	79	62	67
*10	66	70	76	76	58	60	74	77	62	57
11	70	67	85	85	68	70	78	80	64	65
*12	68	71	86	85	60	57	67	64	51	52
13	70	74	83	84	60	58	70	66	55	51
*14	68	62	76	77	66	68	85	87	71	63
*15	76	77	83	82	62	59	72	69	54	58
*16	73	70	81	81	68	67	82	80	59	65
17	71	70	81	81	57	69	63	70	51	64
18	69	62	77	77	63	64	80	81	63	62
19	74	68	86	89	58	62	64	67	55	62
20	75	76	86	83	64	64	73	75	57	62
*21	65	76	76	80	58	60	74	72	49	62
22	76	71	82	81	65	65	77	78	65	60
23	74	71	83	80	58	57	67	66	58	57
*24	70	71	86	85	52	61	69	69	55	52
25	65	71	78	79	56	57	69	69	63	54
*26	71	76	85	85	64	63	73	72	60	50
*27	68	71	73	78	61	60	82	82	56	51
28	68	76	85	83	62	58	70	67	51	57
29	73	70	80	76	62	59	75	75	57	60
*30	71	70	77	79	59	61	74	75	57	58
31	65	57	79	77	70	68	86	87	60	65
32	76	73	86	87	56	59	62	65	55	54
Means:	70.41	70.34	81.25	81.34	62.00	62.03	74.63	74.25	57.78	58.59
S. D.	3.68	4.31	4.63	4.56	4.92	4.13	7.07	7.09	5.31	4.93
"t"	.0383		.077		.027		.212		.633	
F	1.3722		1.135		1.419		1.025		1.119	

*Female pairs
"t" .975 for 31 df = 2.040

With respect to chronological age, the second matching variable, the experimental group obtained a mean of 81.25 months; whereas, the control group mean was 81.34 months. Neither the "t" nor F tests proved significant. It can be assumed that the two groups did not differ with respect to chronological age.

The third matching variable was mental age as determined by the Stanford-Binet, Form LM. Again, as shown in column 3 of Table 1, the difference between the mean score of the two groups was not significant. The experimental group mean was 62.00 months and the control group mean, 62.03 months. With respect to mental age, both the "t" test and the F test were not significant. As would be expected on the basis of the non-significant differences for chronological age and mental age, IQ differences too were non-significant. The mean IQ's for the experimental and control groups were 74.63 and 74.25 respectively. The "t" test for matched groups yielded a "t" value of .212 and an F score of 1.025. The latter was also non-significant and indicated that the variance of the IQ scores were within sampling error.

Finally, the two groups were matched for total language age in months as determined by the Illinois Test of Psycholinguistic Abilities. A "t" value of .633 was not significant and indicated that the experimental and control group means of 57.78 and 58.59 months respectively were within sampling error. An F test of 1.119 was not significant and showed that the variances of the two groups were the same.

The F and "t" tests discussed demonstrated the precision of matching on all variables. It could be assumed that with respect to social class, chronological age, mental age, IQ, and language age, both groups were drawn from a common population with the same means and variances.

Testing the Subjects

All individual testing for pretest, posttest 1, and posttest 2 was carried out by qualified psychological examiners who were uninformed as to the identity of the experimental or control group subjects. For pretesting and both posttesting sessions, subjects from both groups were pooled and randomly assigned to a psychological examiner.

Subsequent to matching and prior to treatment procedures, all children were administered the California Test of Mental Maturity, Short Form; the Lee-Clark California Reading Test, Grade 1; and the Ammons and Ammons Full Range Picture Vocabulary Test. All children selected for the study also received speech and hearing screening tests. Children with significant speech or hearing impairments were omitted. At the conclusion of the treatment period of ten weeks, each child in both groups was administered the entire pretreatment test battery with the

exception of the hearing and speech screening tests. All pretests and both posttreatment testings were completed within two weeks time. For posttest 2, it was necessary to make some test substitutions. The Lee-Clark California Reading Test was no longer appropriate for the children of this investigation because of their age and grade placement. Consequently, the California Reading Test was administered. For posttest 2, it was felt that an individually administered, as well as a group administered reading test would be in order. Consequently, for this testing period, the Durrell Analysis of Reading Difficulty was individually administered to all children. For purposes of economy the Draw-A-Man Test was not administered during posttest 2. These were the only test changes made between posttest 1 and posttest 2.

All group tests were administered by the teachers to both groups. For all testing sessions, all 64 children were randomly assigned to one of eight groups where they were administered the test in groups of eight. Consequently, the composition of each group was a matter of chance. Each of the two teachers administered the test to four groups.

Stage II focused upon the long range effects of the language stimulation program. During this stage, each child in the original Stage I study was located and administered the test battery. Of the original 32 pairs of subjects or 64 children, 58 or 26 matched pairs were located in the same school.

The Teachers and Instruction

The teacher personnel consisted of two experienced primary grade teachers. They worked under the immediate supervision of the investigator throughout the treatment period. This was done to assure, further, the uniformity of methodology and presentation. This was deemed necessary even though the curriculum from the experimental edition of the Peabody Language Development Kit was utilized. Each of the four experimental groups was removed from regular classrooms four times weekly and taken to the room designated for treatment. These sessions were for ten weeks. Each of the four daily sessions began on the hour beginning at 8:00 a.m. The experimental children were randomly placed into one of the four groups without regard to their regular classroom assignment. Consequently, each regular classroom had some children absent from that room and in the treatment sessions almost every hour in the morning. In this manner, randomization of regular classwork missed among the treatment group was accomplished.

The experimental edition of the Peabody Language Development Kit by Dunn and Smith (5) comprised the curriculum with some minor changes. One weakness of similar speech and language stimulation programs has been the lack of precision in defining the curriculum. It was felt that using the Peabody curriculum would

remedy this weakness as well as add significant information concerning the Kit's utility with educationally disadvantaged children. The Kit was made up of two hundred and eighty lesson plans with specific activities delineated for each day. The modifications were necessary in order to provide the 45 to 50 minutes daily language stimulation activities. The first change was that a story was read to the children at the conclusion of each lesson. Secondly, activities from lessons beyond Lesson 40 were selected to supplement each of the forty daily lessons used.

Overview of Sequence

Following is a brief overview of the sequence of procedures: First all children were pretested and placed into matched pairs. One pair, the experimental group, received the language stimulation program for ten weeks. Immediately upon completion of the language stimulation program, all subjects, both experimental and control, were administered the posttest 1 battery. This concluded Stage I. Stage II was essentially a follow-up investigation to determine if the positive experimental results held up over time. Approximately 20 months after the cessation of treatment, both groups were administered posttest 2.

RESULTS

For clarity, the results of Stage I and Stage II will be presented separately. For Stage I, Table 2 summarizes the results of the effects of the language stimulation program. It should be noted that the experimental group gained significantly over the control group on seven of the ten dependent variables. These differences were significant at the .01 level in all instances. Only the Draw-A-Man Test, the Speech Screening Test, and the Lee-Clark Reading Test failed to yield expected differences. Each hypothesis will now be examined in turn for Stage I results, the immediate posttest results.

Hypothesis 1: "A language development program will enhance the language scores of the experimental group over the control group." To test this hypothesis, the Total Language Age of the Illinois Test of Psycholinguistic Abilities (ITPA) and the language mental age of the California Test of Mental Maturity (CTMM) were used as dependent variables. In addition, the Ammons and Ammons Full Range Picture Vocabulary Test (AAFPT) was administered as a brief secondary estimate of language ability. A direct difference "t" test for correlated measures as outlined by Guilford was used as the appropriate statistic. On all three measures the experimental group gains were significantly higher than the control group gains. The experimental group gained 11.31 months on the ITPA Language Age whereas the control group lost 1.75 months. It should be noted that there were approximately five

months between pretest and posttest 1. The experimental group gained over twice that much in L. A. and they gained 13.06 months more than the control group. With respect to the ITPA, Total Language Age, Hypothesis I was supported; the language development program did enhance the language age scores of the experimental group over the control group.

The California Test of Mental Maturity, Language Mental Age (CTMM, LMA) was the group administered dependent variable used to assess the effects of treatment. Again the experimental group gained significantly over the control group. The experimental group gained from 56.00 to 66.53 months or a total of 10.53 months during the treatment period while the control group lost 1.45 months from 55.41 to 53.94 during the same period. This difference in gains' scores was statistically reliable at the .01 level of confidence. Thus, the first hypothesis was further supported by the results obtained on the CTMM, Language Mental Age.

Vocabulary level was another means of assessing language ability. For the present study the vocabulary test used was the Ammons and Ammons Full Range Picture Vocabulary Test. Table 2 shows that the experimental and control groups scored 65.53 and 65.84 respectively during the pretest. For the posttest, however, the experimental group obtained a mean vocabulary age of 73.09 months and the control group had a vocabulary age of 67.25, a gain of 7.56 and 1.41 months respectively. This difference in gains' scores was significant at the .01 level of confidence. The experimental group gained 6.15 months more than did the control group during the same period of time. In augmenting vocabulary age, it must be concluded that treatment was effective with the experimental group.

All three dependent variables used to test Hypothesis I yielded significant results in favor of the experimental group. It may be concluded that a language development program did enhance language age of the experimental group over the control group.

Hypothesis II: "A language development program will enhance the mental age of the experimental group over the control group." To test this hypothesis, two dependent variables were used: Stanford-Binet Mental Age and the Total Mental Age score on the California Test of Mental Maturity (CTMM, Total MA).

Again Table 2 presents the results. On the Stanford-Binet the experimental group gained 10.63 months, from 62.00 to 72.63 during the experimental period. During the same period the control group gained from 62.03 to 66.81 or 4.78 months. In other words, the experimental group gained 5.85 months more in mental age than did the control group during the same interval of time. With respect to mental age as obtained on the Stanford-Binet,

Table 2

Pre and Posttest I Comparison of Experimental Group Gains
Over Control Group Gains

Tests	Experimental			Control			E Gains Over C Gains
	Pre	Post 1	Diff.	Pre	Post 1	Diff.	
Stanford-Binet MA	62.00	72.63	10.63	62.03	66.81	4.78	+ 5.85 **
Stanford-Binet IQ	74.63	83.44	8.81	74.25	76.78	2.53	+ 6.28 **
ITPA Total LA	57.78	69.09	11.31	58.59	56.84	-1.75	+ 13.06 **
CTMM							
Lang. MA	56.00	66.53	10.53	55.41	53.94	-1.45	+ 11.98 **
Non-Lang. MA	60.50	74.72	14.22	56.53	66.06	9.53	+ 4.69 **
Total MA	56.25	69.03	12.78	53.25	58.56	5.31	+ 7.47 **
Ammons and Ammons MA	65.53	73.09	7.56	65.84	67.25	1.41	+ 6.15 **
Draw-A-Man MA	65.34	66.63	1.19	64.03	64.97	.94	+ .25
Lee-Clark Reading (raw score)	15.47	22.09	6.62	14.28	20.69	6.41	+ .21
Speech (raw score)	30.50	32.25	1.75	31.19	31.56	.37	+ .38

Except as noted all scores are in months

**Significant @ .01 level for 31 df

Hypothesis II was supported. A language stimulation program did enhance the mental age of the experimental group over the control group.

A second test of Hypothesis II was the Total Mental Age on the CTMM. Table 2 again indicates that the experimental group gained significantly more than the control group during the treatment period. This difference, too, was significant at the .01 level of significance with the experimental group gaining 7.47 months more than the control group. Consequently, further support was given to Hypothesis II, a language stimulation program did enhance significantly the mental age of the experimental group over the control group. This was true for both the individually administered and group administered estimates of mental age. Hypothesis II must be accepted.

Hypothesis III: "A language stimulation program will enhance the reading level of the experimental group over the control group." To test this hypothesis, the California Lee-Clark Reading Test was administered. Only the Total Raw Score was used because of the reported instability of the short subscales and the difficulty in converting raw scores to scaled scores by visual inspection. The results on Table 2 indicate that there was no treatment effect favoring the experimental group. That is, the experimental group did not gain significantly more in reading ability as measured by this test than did the control group. The two groups gained 6.62 and 6.41 respectively. This did not lend evidence in support of the hypothesis. An examination of the data indicated that girls consistently scored higher than boys on both the pretest and the posttest. This consistent sex difference was computed to be significant at the .001 level of confidence. It should be remembered that this was not a difference in gains, but only that the girls scored higher on both tests.

Evidence in support of Hypothesis III was lacking. A language stimulation program did not enhance the reading level of the experimental group over the control group for Stage I, immediate effects.

The following is a summary of the immediate effects of a language stimulation program upon educationally disadvantaged first grade children:

1. All three dependent variables concerning augmentation of language age as a result of a language stimulation program were supported. Treatment resulted in enhancement of the language ability of the experimental group over the control group. Hypothesis I was strongly supported.

2. The two dependent variables dealing with increments in mental age yielded results favoring the experimental group over

the control group. It must be concluded that a language development program was effective in increasing the mental age of the experimental group. Hypothesis II was also given strong support.

3. There was no treatment effect upon enhancing reading ability. It must be concluded that both groups gained equally. Hypothesis III was not supported. A post hoc result, however, indicated that girls consistently scored higher than boys on both the pretest and posttest.

The statistical analysis of Stage I, may be said to provide considerable evidence for the efficacy of a language stimulation program in increasing language age and mental age for first grade educationally disadvantaged children. The effects of such a program did not generalize to reading and were equally effective with boys and girls.

Stage II Results

Stage II was concerned with a follow-up testing of the original experimental and control groups. Here, the attempt was to assess the long-range effects of the language stimulation program upon educationally disadvantaged first grade children. The same three hypotheses were tested but at a later point in time. Approximately 20 months following the completion of posttest 1, the children were administered posttest 2. In essence, the basic questions were: Do the immediate results hold up over time? Were the increments obtained in mental age and language age stable or will the two groups be fused and non-distinguishable on the dependent variables?

There were a number of statistical means of handling Stage II data. The writer chose to use a straightforward and direct means of treating the data. With this in mind, the same three original hypotheses were tested by the use of the direct difference "t" test for matched groups. As in Stage I, each hypothesis will be presented separately and in order.

Hypothesis I: "A language development program will enhance the language age scores of the experimental group over the control group." The results of Stage I confirmed this hypothesis. The current question is, "After twenty months following the cessation of treatment, is the experimental group still ahead of the control group in language age." For the original study, the Total Language Age on the Illinois Test of Psycholinguistic Abilities and the Ammons and Ammons Full Range Picture Vocabulary, Vocabulary Age were used to test this hypothesis along with the language scores on the California Test of Mental Maturity. The first two measures were used again to compare the language age of the experimental and control groups. Table 3 summarizes the results of Stage II. On posttest 2, the experimental group attained a Total Language Age

of 76.92 months while the control group scored 72.00 months on the ITPA. This was a difference of 6.92 months in favor of the experimental group. This difference was significant at the .01 level of confidence. It must therefore be concluded that the treatment did result in enhancing language age scores of the experimental group over the control group and that the experimental group maintained this advantage on the ITPA language age twenty months following the cessation of treatment. Although the absolute difference in favor of the experimental group changed from 13.06 months to 6.92 months, it may be said that the experimental group was still ahead of the control group.

During Stage 1, the Vocabulary Age on the Ammons and Ammons Full Range Picture Vocabulary Test was used as a second measure of language change. Although, the immediate posttest results indicated a significant gain, in the Vocabulary Age, Table 3 indicates that there was no longer a significant difference between the experimental and control groups for posttest 2. In other words, the initial gains made by the experimental group had "washed out" during the twenty months following the cessation of treatment. It should be noted that the Ammons and Ammons is a relatively short, quick-scoring method of obtaining a vocabulary age and that perhaps this test is not as sensitive as the longer and more detailed Illinois Test of Psycholinguistic Abilities. Nevertheless, Hypothesis I can be accepted only equivocally on the basis of the data at hand.

Hypothesis II states that "a language development program will enhance the mental age of the experimental group over the control group." To test the long range effects of the language stimulation program upon this hypothesis, the Mental Age of the Stanford-Binet, Form LM was used. It should be remembered that the immediate results indicated a significant enhancement of the mental age of the experimental group over the control group. The results of this effect apparently held up over time as Table 3 indicates. For posttest 2, the experimental group had a mental age of 92.16 months and the control group, a mental age of 85.44 months. The difference between these two groups was significant at the .01 level of confidence. These results indicated that the language stimulation program was effective, not only in the immediate effects of enhancing the mental age of the experimental over the control group but in stabilizing these gains. It should be noted that there was a 6.28 months difference at the end of Stage I and a 6.72 months difference at the end of Stage II. The absolute difference in mental age did increase slightly over time in favor of the experimental group.

Extensive research has indicated that the mental age obtained on the Stanford-Binet is the best single predictor of academic expectancy or scholastic ability of all known tests. For this reason, Hypothesis III was extensively tested. This hypothesis states, "A

Table 3
Summary of Posttest 2 Results

Test	Exper. $\overline{X}$	Control $\overline{X}$	Diff.	"t"
ITPA Total Language Age	76.92	72.00	6.92	10.5128 **
Ammons and Ammons M. A.	90.41	89.54	.87	.0312
S-B IQ	86.82	81.42	5.40	2.0705 *
S-B MA	92.16	85.44	6.72	5.8333 **
Calif. Reading - Total[1]	3.20	2.85	.35	2.1585 *
Calif. Reading - Vocabulary[1]	3.09	2.85	.24	1.0524
Calif. Reading - Comprehension[1]	2.95	2.83	.12	.6029
Durrell Oral[1]	2.96	2.39	.57	2.1154 *
Durrell Silent	2.42	1.86	.56	3.5060 **
Durrell Listen. Comp.[1]	2.78	2.30	.48	1.9639
M. A. Achievement Expectancy	2.68	2.12	.56	

[1] Scores reported in grade level
* Significant @ .05 level
** Significant @ .01 level

Table 4
Pre, Posttest 1, and Posttest 2 Comparison of Gains Scores

	Experimental			Control			
Tests	Pre	PT 1	PT 2	Pre	PT 1	PT 2	Diff.
ITPA LA	57.8	69.0	76.9	58.6	56.8	72.0	4.9
Ammons MA	65.5	73.0	90.4	65.8	67.2	89.5	.9
S-B MA	62.0	72.6	92.16	62.0	66.8	85.44	6.72
S-B IQ	74.6	83.4	86.82	74.2	76.8	81.42	5.40
Calif. Reading	.6	.8	3.2	.5	.8	2.8	.4

language development program will enhance the reading ability of the experimental group over the control group." In other words, to raise mental age and language age without this resulting in enhancement of scholastic ability would be meaningless. This hypothesis raised the question, if mental age and language age can be increased, does this increase generalize to academic success or academic ability? Hypothesis III thus was crucial in a pragmatic sense. Two different tests were used to evaluate Hypothesis III. The California Reading Test was used as a group measure and the Durrell Analysis of Reading Difficulty was used as an individually administered test of reading. Table 3 indicates that the total reading score of the experimental group obtained on the California Reading Test was significantly higher at the .05 level than the total reading score of the control group. The major sub-tests of the California Reading Test, however, did not indicate significant differences. That is there were no differences in Word Usage, Test A and B, or in Comprehension, Tests C, D, and E. Nevertheless, it must be assumed that the treatment did result in generalizing to reading ability as measured by the California Reading Test and that, although, there was no differential treatment in reading instruction per se, the experimental group at this time did score higher on this reading test. Turning to the Durrell, Table 3 shows that the experimental group did score higher on both oral and silent reading than did the control group and that these differences were significant at the .05 and .01 level respectively. It must be assumed that the intervening variable of language stimulation did act to generalize to reading ability. For reading, the data is presented in terms of grade level. On the Durrell Oral Reading, the experimental group obtained a grade equivalent of 2.96 or nearly third grade, whereas, the control group scored at 2.39 or not quite midway of the second grade. This means that there was a little more than one-half year's difference in the two groups in oral reading ability. Both groups scored lower on Silent Reading, the experimental scoring at 2.42 grade level while the control group scored at grade level of 1.86 or near the end of the first grade. Again there was a little more than a half year's difference between the two groups. This difference was highly significant. It should be noted that neither group was scoring at grade level and that the children when tested were at grade level of 3.5, but that the experimental group scored considerably closer to actual grade placement. The last figure in Table 3 is simply the expected achievement level in terms of grade level. The experimental group, in terms of their mental age could be expected to be achieving a grade level of 2.68 whereas, the control group could be expected to be achieving at a grade level of 2.12. Again, there was a .56 of a year difference in favor of the experimental group. This appeared to be reflective of the higher obtained mental age of the experimental group. It should be noted that for both groups the expected level falls between the oral and silent reading levels and that for both groups Oral Reading is somewhat above the expected achievement level. Consequently, not only was the experimental group, which now has obtained a higher mental age,

expected to achieve more because of this increase, they in fact were achieving approximately one half year higher in reading than was the control group. In terms of reading, it must be concluded that the gains made by the experimental group were not only initially a result of treatment consisting of language stimulation but that these gains have generalized to reading ability. It should be noted that posttest 1, the test immediately following treatment, did not yield a significant difference in reading. Therefore, it must be concluded that the experimental children because of their relatively greater language facility were able to generalize this facility to a more adequate production in learning to read. It should be remembered that immediately following treatment, the experimental group did not surpass the control group in reading ability; therefore, this ability did not stabilize but emerged subsequent to the termination of treatment and perhaps as a result of it.

Table 4 presents the changes in test scores from pretest to posttest 1 and posttest 2 for the major dependent variables of the current language stimulation study. On the ITPA Language Age, the control group changed from 57.8 months to 69.0 months from the pretest to the posttest. This 11.2 months change was obtained in approximately three months as a result of treatment. From posttest 1 to posttest 2, the experimental group gained only 7.9 months during the 20 months interim following termination of treatment. The control group, on the other hand, lost 1.8 months between the pretest language age of 58.6 to the posttest 1 language age of 56.8. From posttest 1 to posttest 2, however, the control group gained 15.2 months following treatment. Figure 1 presents this data for the ITPA Language Age in a more dramatic fashion. Several questions come to mind. For example, why does the experimental group gain only 7.9 months during the 20 months period between posttest 1 and posttest 2, whereas, the control group gained 15.2 months or nearly twice as much for the same period of time. A number of alternative answers suggest themselves. One would be related to diffusion effects from the experimental group to the control group children in their day-to-day interaction. In this respect, the experimental group would be able, due to their increased linguistic ability, to stimulate the control group to considerable gains in linguistic ability and this stimulation would not be reciprocal. They, the experimental group, would not be subjected to the same kind of stimulation, and hence would show a slower rate of language growth. Another alternate suggestion presents itself in the form of the educational system. Perhaps the educational system was keyed more adequately to the abilities of the control children following treatment and that these children were able to profit from it, but that the experimental group had already achieved this level of linguistic finesse or competence and, therefore, did not profit from the general language program of the schools. That is, the educational system was meeting the language needs of the control group more effectively, following treatment, than it was the experimental group, following treatment. Perhaps

Figure 1
Mean Change in Language Age Over Time

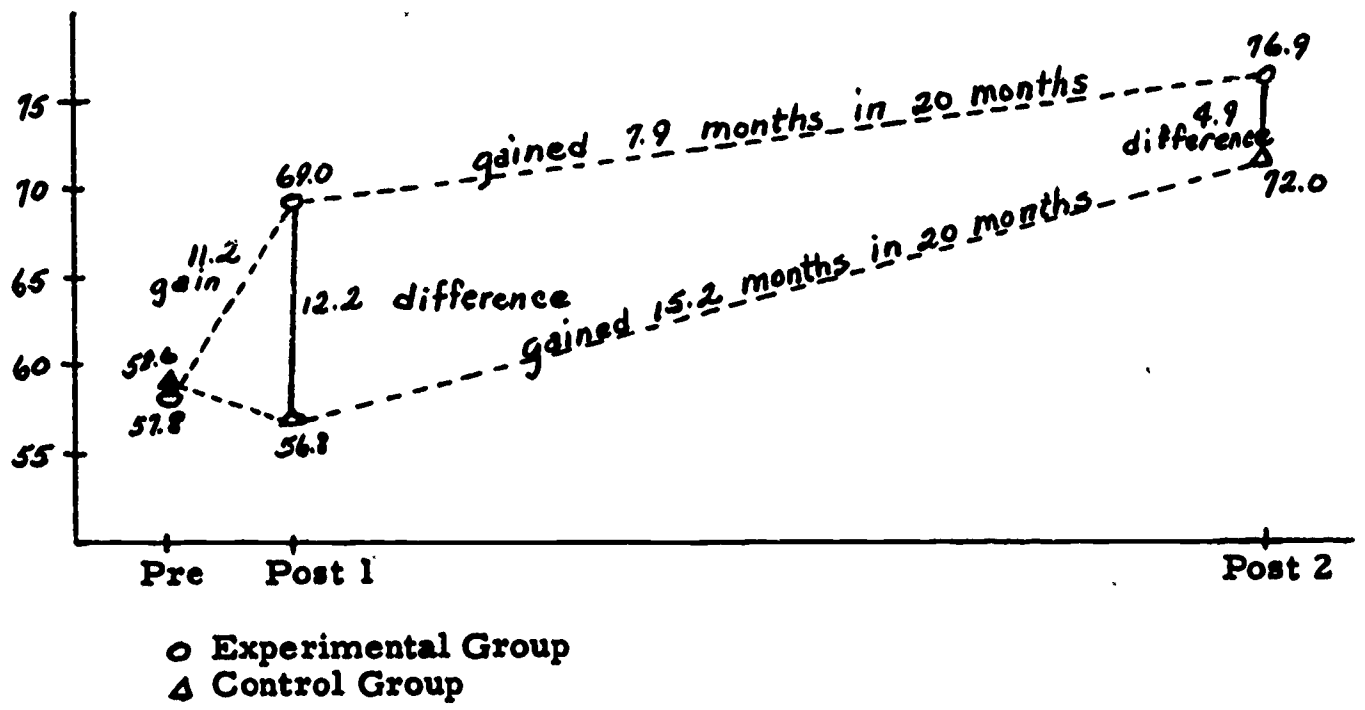


Figure 2
Mean Change in IQ Over Time

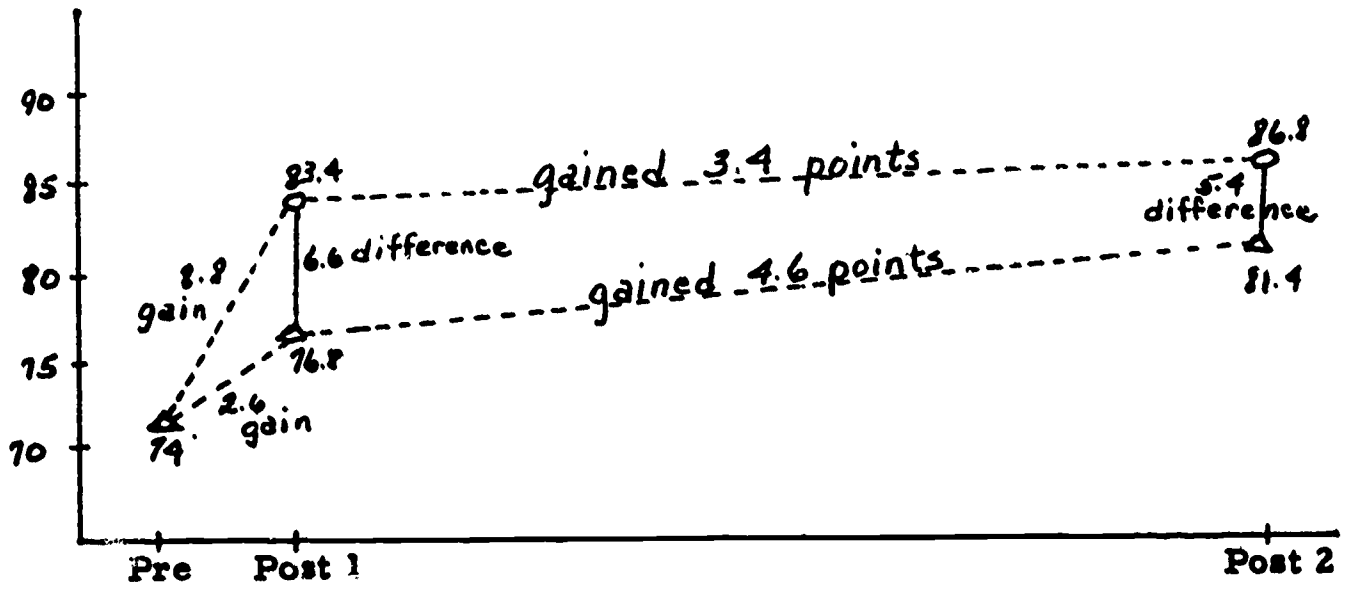
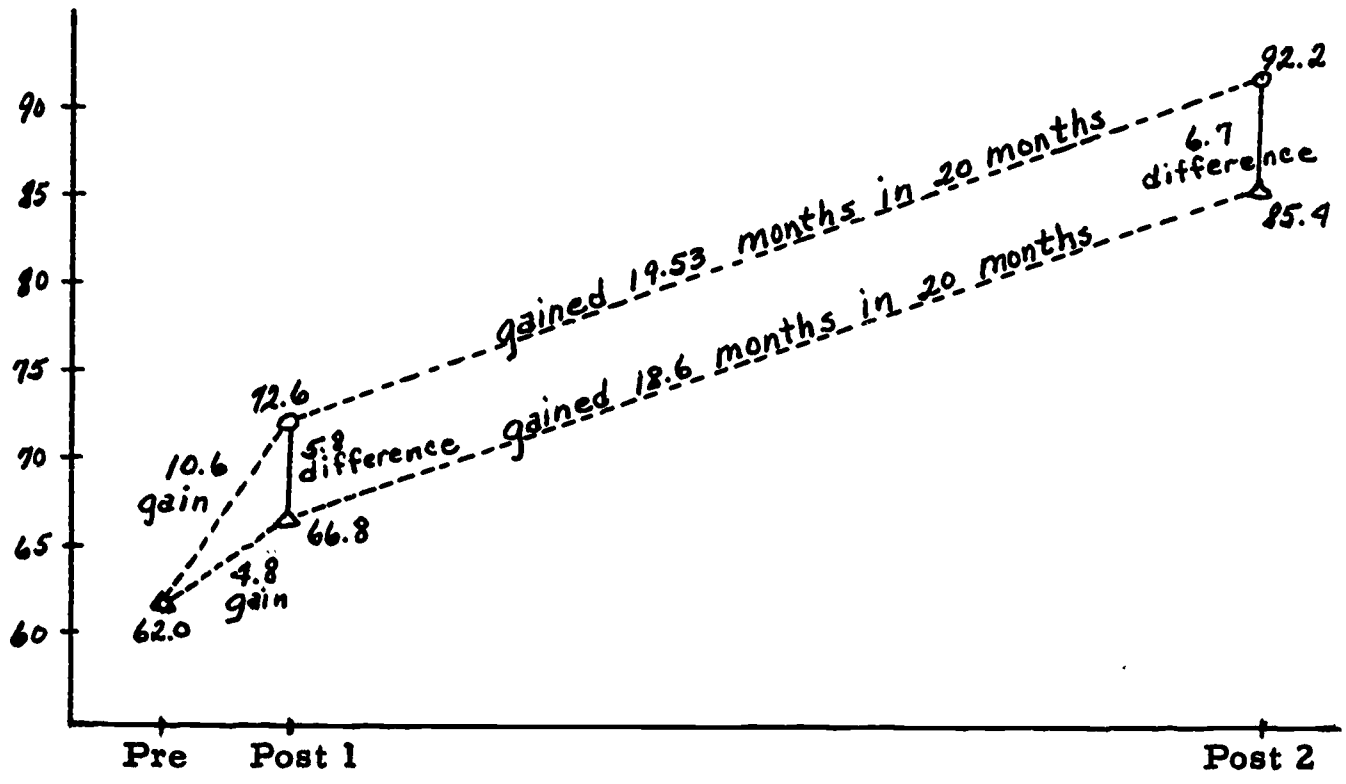


Figure 3
Mean Change in Mental Age Over Time



o Experimental Group
Δ Control Group

the interactive effects of both explanations plus other explanations were at work. The changes in the Stanford-Binet Mental Age is also depicted on Table 4 and Figure 3. It will be noted that both groups began with mental age of 62.0 months for the pretest. The experimental group gained 10.6 months apparently due to treatment effects during the four months between pretest and posttest 1. For the next 20 months following posttest 1, the experimental group gained to 92.16 or nearly 20 months. The control group gain was from 62.0 months to only 66.8 months during the four months of treatment. That is, they gained 4.8 months during four months period. For the 20 months between posttest 1 and posttest 2, however, the control group gained approximately 18.6 months which was a slightly less rate of gain than that of the experimental group. This ratio of mental age gain to twenty months period of time would indicate a rate of gain of .93. This demonstrated that the control group gained in mental age at a rate greater than the obtained IQ of 81; they could only be expected to have gained 16.20 months if IQ as a rate of mental growth were in operation. The experimental group, too, gained at a rate greater than would be indicated by the obtained IQ; although the discrepancy was not so great.

On IQ both groups also show a steadily increasing value as shown on Table 4 and Figure 3. During the 4 months between pretest and posttest 1, the experimental group gained from 74.6 to 83.4 or 8.8 points. A 3.4 point gain was registered between posttest 1 and posttest 2. The control group on the other hand, gained from 74.2 to 76.8 or 2.6 months between pretest and posttest 1 and 4.6 between the 20 month interlude between posttest 1 and posttest 2. Therefore, in this measure of intelligence quotient, neither group is regressing in a manner indicated by Kennedy, et. al. (10). It should be remembered that Kennedy found a decreasing value of the obtained Stanford-Binet IQ of school age children over time. Perhaps the language stimulation program to one-half of the children in this study was able to have generalizable effects from the experimental to the control group. That is, perhaps a group of children not directly involved in a given program may profit from it indirectly through the students that did participate. Similar results were obtained from reading. Kennedy, et. al., (10) found that not only did Stanford-Binet IQ decrease over time with culturally disadvantaged Negro children but that the discrepancy between expected achievement and actual achievement widened as the children passed through the grades. This was not found to be true for either group in the present investigation. The children were first tested approximately one-third of the way through their first year in school and the experimental and control group obtained a reading level of .6 and .5 respectively; indicating that they were approximately one year behind what would be expected of typical first grade children. Near the end of this school year, both groups tested at .8 grade level on the California Lee-Clark Reading Test indicating prefirst grade or near the beginning of first grade reading ability. Again, they were approximately one year behind what would be expected.

For posttest 2, the experimental children tested at grade level of 3.2 when, in fact, their actual grade level was 3.5. At this point in time, they were only .3 of a year behind what would be expected and this could not be considered to be realistically significant deviation. The control group was, however, approximately .7 of a year behind their actual grade placement in reading attainment on the same reading test. It is felt that this is a deviation to be concerned about from an educational point of view for children of this age. It is assumed that the reason for the experimental group's attainment rests upon the language stimulation program.

Post Hoc Results

Frequently, following the direct testing of experimental hypotheses, the examiner wishes to view the obtained data from slightly different points of view, or to determine what other relationships may be deduced.

The first post hoc result deals with IQ. Tables 2 and 3 indicate that the experimental group initially made significant gains in Stanford-Binet IQ and that these gains were still in effect during posttest 2. Although, the data is not presented, girls consistently scored higher than boys.

A second post hoc finding was obtained by ascertaining possible differential effects of treatment on all dependent variables by pretest IQ levels through analysis of variance. No significant IQ interactions were found to indicate any substantial dependence of treatment on IQ. That is, there were no differential effects of treatment based upon differences on pretest IQ. Experimental children of all IQ levels apparently made equal gains.

A third, but related, post hoc analysis deals with the correlation between initial test scores and gains' scores on posttest 1. This was computed for the experimental or treatment group only. The Pearsonion correlation coefficient is presented in Table 5.

Table 5

Correlation Between Pretest and Gains' Scores
On Posttest 1 of Selected Dependent Variables
for Experimental Group

Test	r	Test	r
Stanford-Binet; MA	-.09	CTMM Lang. MA	-.21
IQ	-.12	Non-Lang. MA	-.50 **
ITPA Total LA	-.01	Total MA	-.35 *
Lee-Clark Reading	-.15	Ammons and Ammons	-.42 *

* Significant @ .05 level of confidence for 31 df

** Significant @ .01 level

First it should be noted that all correlations are negative indicating either that lower initial scores result in larger gain scores or that higher initial scores are related to lower gain scores. Three of the eight test scores were significant indicating a significant inverse relationship between pretest and posttest 1. One can only conjecture or hypothesize reasons for this. It is interesting to note that the CTMM Non-Language Mental Age shows the highest inverse relationship. This result may be related to an unpublished finding of Weikart [1] that the Leiter International Performance Scale best predicts amount of gain. Perhaps a more thorough evaluation of performance or non-verbal tests is in order if the possibility exists that they may be better predictors of verbal gains.

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[1] Personal verbal communication

Summary of Results

The following summarizes the major findings of this present investigation:

1. On both posttest 1, immediate results, and posttest 2, long range follow-up results, treatment resulted in enhancement of the language ability of the experimental group over the control group on the Total Language Age of the Illinois Test of Psycholinguistic Ability. On the Ammons and Ammons, however, treatment indicated a significant difference in favor of the experimental group at posttest 1 for immediate effects of a language stimulation program. But this difference disappeared for posttest 2. It was felt that this did not, however, severely jeopardize the hypothesis that "a language stimulation program will enhance the language ability of the experimental group over the control group" as the major dependent variable, ITPA Language Age indicated a significant difference at both posttest 1 and posttest 2.

2. Hypothesis 2 was confirmed. A language stimulation program did enhance, not only the language age of the experimental group but also the obtained Mental Age of the Stanford-Binet, Form LM. This was not only an immediate effect but also a long term effect. The difference between mental age of the two groups at posttest 1 tended to stabilize and must be attributed to treatment.

3. For immediate effects on posttest 1, there was no treatment effect upon enhancing reading ability. There was, however, a long range effect upon reading. The experimental group scored higher on the Total Score on the California Reading Test and upon the Oral and Silent Reading sub-tests of the Durrell Analysis of Reading Difficulty. It must be concluded that the language stimulation program did generalize to reading skills. This, of course, was one major expressed or implied goal of language stimulation. It was hoped not to increase language ability per se, but that the efficacy of such a program would result in more adequate academic performance. The results of this study tend to support this hope.

DISCUSSION AND IMPLICATIONS

This discussion is presented primarily to attempt to synthesize the major results of this study with the findings of other research. In addition, the implications to education and for further research in this area will be covered. Throughout the study, it was assumed that the subjects were representative of culturally disadvantaged first grade Negro children attending a segregated school. Therefore, it is felt that implications are generalizable to other similarly situated disadvantaged children.

The immediate results of this study presented evidence

concerning the efficacy of a group language stimulation program in increasing language age and mental age of culturally disadvantaged children within a ten week period, a relatively short period of time. The experimental edition of the Peabody Language Development Kit was selected prior to the testing of the children; therefore, the program was not clinical or aimed at remediating specific language disabilities. For practical educational purposes, the economy of a general language stimulation rather than a clinically determined program is obvious. Considerable time and effort was saved in differential evaluation and program planning.

The results concerning the increase in language age with culturally disadvantaged children was consistent with similar results obtained through experimentation with exceptional children. Smith (16) demonstrated the efficacy of a similar program with educable retarded children: he, too, used a generalistic approach. Using a clinical or remedial approach, Blessing (1) was able to enhance language ability of educable retarded children. Increments in mental age following a language development program have also been reported for trainable retarded children (Blue, 3) and cerebral palsied children, Hart (8).

In relation to culturally deprived children, the results of this study were in agreement with a few others which have been located. Gray and Klaus (7) instituted a summer program followed with home contact at two preschool age levels, 3-1/2 and 5 years. They used a design utilizing matched control groups. The younger expermental group gained 10.1 IQ points while their matched controls lost 5 points. Treatment was over a fifteen months period. The older experimental children, age 5 at the beginning of the study, increased 5.1 points in IQ and the controls showed a decrease from 88.00 to 85.5 or 2.5 points over the same period of time. No indication of increments in language was noted. In the present study, the experimental children showed an immediate gain of 8.81 months on the Stanford-Binet during the ten weeks of the experimental treatment and an additional 3.4 point gain in the twenty month interim between posttest 1 and posttest 2 or a total of 12.2 IQ points in the approximately two years between pretest and posttest 2. The control group, on the other hand, showed immediate gains of 2.6 months between pretest and posttest 1 followed by a 4.6 gain in the twenty months between posttest 1 and posttest 2. The total gain was 7.2 IQ points in the two-year interim between pretest and posttest 2.

Weikart (18) in a well designed preschool study was attempting to determine the effects of an intensive preschool intervention program upon educationally disadvantaged children. To date, only tentative and sketchy data has been published. Nevertheless, it appears that language age gain as well as mental age gain was superior for the experimental group at least for the first year. During the second and third years, however, the differences in IQ diminished to non-significance. In the current investigation, the

differences in IQ also diminished somewhat, although at this point in time there is still a significant difference. It can only be postulated that these differences will in fact decrease to non-significance over a period of time. This is true especially since the cessation of the original treatment no other intervention program has been on-going. In Weikart's study, the intervention has continued and still the initially obtained IQ differences have disappeared within two years.

The studies mentioned were concerned with preschool educational intervention. According to Bloom (2, p. 72) IQ scores of culturally disadvantaged children tend to "decrease after about age 5." Kennedy, et. al (10) demonstrated the decrease dramatically in their Southern state survey using the Stanford-Binet. In a similar vein, Deutsch (4) reported that studies indicate that social class differences in language ability tend to increase with age. Disadvantaged children not only first enter school linguistically handicapped in their ability to compete with higher social class peers but their relative linguistic ability decreases as they pass through the grades. This decrease in the ability to compete not only results in lowering linguistic age, mental age, and IQ over time, it generalizes to school achievement. Hill and Giamatteo (9) point out that by grade 3, children from the lower social class were 8 months behind children from higher social class in vocabulary achievement, 9 months behind in reading comprehension, 6 months behind in arithmetic, and 7 months behind in total achievement. It has been repeatedly pointed out that children from the lower social class simply have not received the background of preschool home experience requisite for adequate first grade work; that these children especially lack the language skills which the school expects. Although, the success in enhancing language age and mental age of disadvantaged children at the preschool age has been pointed out, a second question arises. Can the school, within its regular administrative framework, enhance language and mental age? The results of this study would indicate an affirmative answer to this question. Not only can language age and mental age be enhanced immediately following a relatively short language stimulation program but these gains tend to remain for at least two years and appear to generalize to overall reading abilities. And this is the crux of the current investigation from a very pragmatic point of view. The experimental children are performing at a significantly higher level in reading than are the control children. The efficacy of a language stimulation has been measured against scholastic progress and fared well. Regrettably, a more comprehensive achievement test battery was not employed.

Implications for Education

For the past few years educators and public school administrators have been aware of the unique educational problems presented by culturally deprived children. At the same time there has

been a lack of empirical evidence concerning the early public school treatment of these children. That these children were linguistically handicapped has been known, but how to deal with the children has been a matter of conjecture. The results of this study indicate that it is possible to effect positive changes in language age and mental age of culturally deprived children through a short term and small group general language development program. The general findings of a cumulative defect posited by Deutsch (4) and supported by the data from Kennedy (10) need not be typical. The school within its established framework can work to reverse or arrest the progressive downward trend in language and mental abilities of deprived children. What kinds of modifications might be obtained if such a language stimulation program were made an integral part of the deprived child's curriculum early in his school years and over a period of several years? Or if such a program were incorporated into an early preschool program? Future educational research would do well to direct its attention to these problems. Ultimately, the efficacy of such a program must be measured against scholastic progress.

A second significant educational implication must be settled through further research. It has been established that a small group language development program can enhance both the mental age and language age. Whether this can be done by the regular class teacher or by a "language developmentalist" as recommended by Smith (16) must be investigated. Another possibility lies in the use of a language development consultant as a resource person for the regular class teacher. For the present, the need for and efficacy of a carefully organized language stimulation program has been established.

One weakness of other similar studies has been the failure to specify the curriculum in sufficient detail so that it could be used by other interested investigators. For this reason, the Peabody Language Development Kit was used. Its utility has been demonstrated by other research projects. This study lends further support to the use of this curriculum.

Implications for Research

A myriad of ideas for extending this research project in order to gain further knowledge is suggested. Following is a brief discussion of a few possible directions for further research which may be stimulated from this project.

First, what is the maximum size of the group in order to insure the desired results? In the present study, each group contained eight children. Would the results have been as effective with 10, 15, 20, or 30 children? If the number can be increased to 25 or 30 with similar results, the educational implications would be dramatic. Perhaps, most first grade teachers could

conduct a language stimulation program for the entire class, if given appropriate training. Or a language developmentalist could work with an entire class rather than with segments of a class required in small grouping. A number of studies similar to the present one utilize small groups, eight to fifteen children. Is this done to help insure obtaining statistical significance? On what basis should the judgment concerning group size be made? Only more research can add facts to guide this judgment.

The second variable which may be considerable for research concerns the length of time or duration of a language stimulation program. This and other studies were of relative short duration. One could hardly expect proportionate increments in language and mental age over two or three years time as the gains obtained in this investigation in a period of ten weeks. Weikart (18) presents tentative evidence which indicates that initial gains in mental age are lost by the end of the second year, the control group means increase to equal the means for the experimental group. Is this an artifact of his design or methodology?

Perhaps a program similar to the current study but for an entire year would be more effective in long range benefits accruing to the experimental children. In addition, one wonders if the effects of the program would be more likely to stabilize or become permanent in a treatment program of longer duration. In a longer period of time the benefits of a language stimulation program may generalize to achievement in school subjects such as reading. If this is found to be true, disadvantaged children enrolled in such a program may find more satisfaction with the school and consequently not be so eager to drop out. Only further research will answer these questions and provide facts for future programming.

A third area for research concerns the best age for maximum returns for the inauguration of a language stimulation program. As noted previously, a number of writers indicate that early preschool intervention produces the most positive results. The results of the present study indicate that a language stimulation program is effective in enhancing language age and mental age of disadvantaged first grade children. An investigation systematically controlling the age of entrance into such a program is sorely needed. Such a study would of necessity include following the children through the elementary grades.

Fourth, future research needs to be directed toward other culturally deprived groups of children such as the various Spanish speaking, Oriental, and Indian groups. Would a program such as this yield results as conclusive as those of this study? The term "culturally deprived" encompasses a number of types or groups of indiyiduals. Would the same language stimulation program be equally effective with all groups?

Finally, who should conduct the language stimulation program? Whether the regular class teacher is capable of doing this effectively, or whether a language developmentalist is required for significant results, is open to speculation at this time. The use of an itinerant teacher is possible. Another possibility lies in the use of a resource teacher acting as a language development consultant to the regular class teachers. Would each method be equally beneficial? Research and experience will provide the answers in time.

The purpose of this discussion was to integrate and extend the major findings of this investigation. It was hoped that further research would be stimulated concerning the enhancing of language ability of culturally deprived children.

SUMMARY

Two groups of educationally disadvantaged Negro first grade children were carefully matched on the following variables: McGuire-White Index of Social Status; Stanford-Binet, Form LM, IQ and M. A.; chronological age; and language age as determined by the Illinois Test of Psycholinguistic Abilities. In addition to the pretest battery, all subjects were administered the Ammons and Ammons Full Range Picture Vocabulary Test; the California Test of Mental Maturity, Short Form; the Lee-Clark California Reading Test, Form A; a speech screening evaluation; and an auditory sweep-check test. This concluded the pretest battery. After careful individual matching, each child was randomly placed in one of two groups. Then one group was randomly designated as experimental. The second group became the control group. In all, there were 32 pairs of children carefully matched. An equal number of boys and girls were in each group.

The experimental group received treatment consisting of the first 40 lessons of the experimental edition of the Peabody Language Development Kit. The control group received no treatment; they were only identified and participated in all testing periods.

The effects of the language stimulation program were examined both in terms of immediate results, and in long-range results. Immediately following the termination of the treatment program all subjects of both groups were readministered the entire pretest evaluation battery with the exceptions of the speech and hearing screening tests and the Index of Social Status.

The immediate results indicated very significant gains for the experimental group over the control group in IQ, mental age, and language age. There was no difference in reading ability, but in reading girls consistently scored higher than boys on both the

pretest and posttest. Basically, this concluded evaluation of the immediate effects of the language stimulation program, or Stage I.

Stage II was concerned with the long-range effects of the treatment program. Twenty months after the cessation of treatment, the subjects were again evaluated to determine if the positive results of the language treatment were still in effect. Essentially, the same results were obtained. The experimental group still scored significantly higher on the Total Language Age of the Illinois Test of Psycholinguistic Abilities, although, the absolute difference between the two groups did diminish somewhat. The experimental group also maintained their significant enhancement of mental age and IQ.

Of special interest were the results on the two measures of reading. During the Stage II evaluation, the experimental group scored significantly higher than the control group on California Reading Test, Total Score and on the Oral and Silent Reading portions of the Durrell Analysis of Reading Difficulty. These and post hoc results were discussed in detail as were implications for education and research.

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